



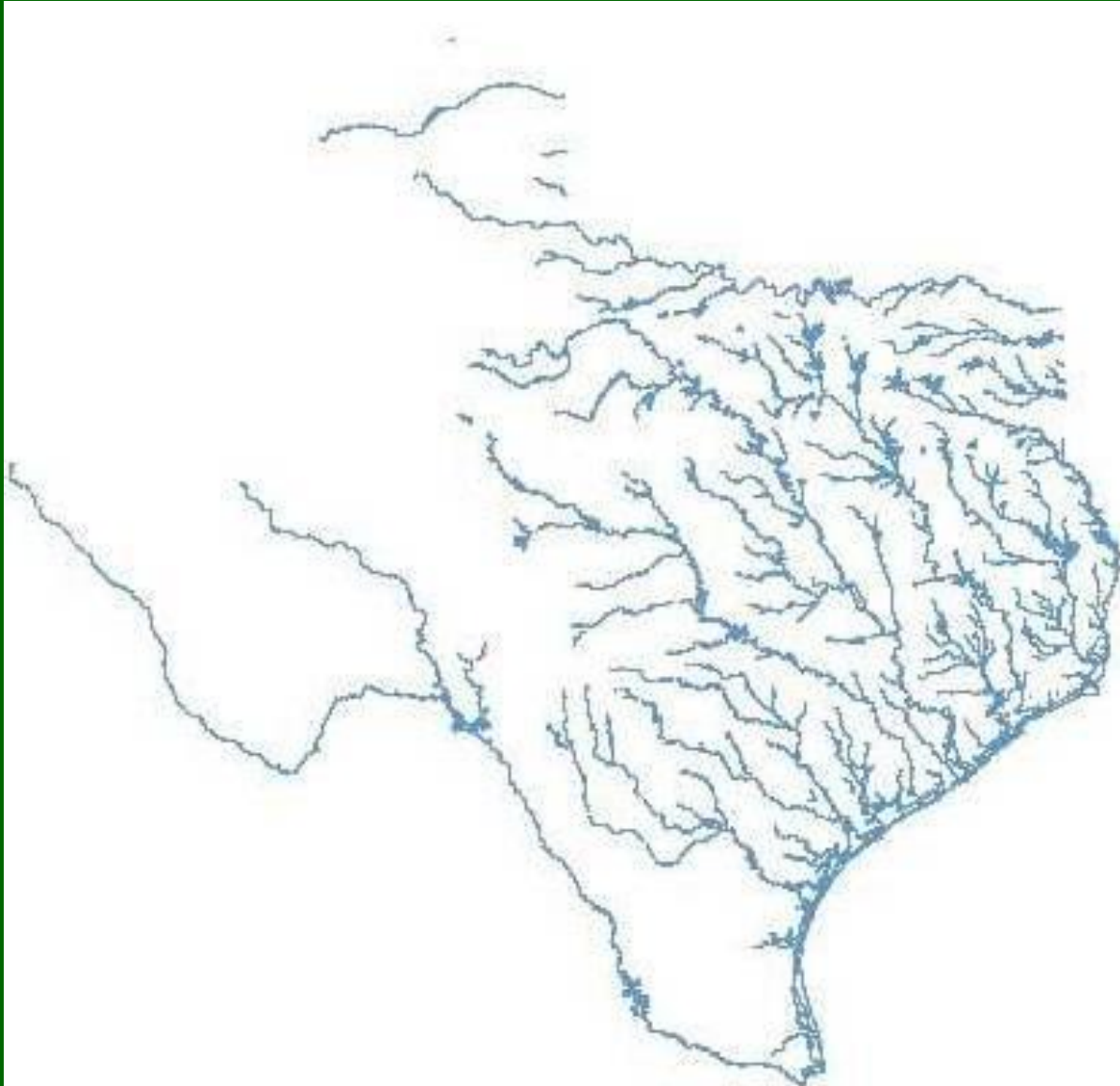
Understanding Creeks, Rivers, and



Riparian Areas



Texas has some severe water challenges





Watershed
vs.
Catchment

A photograph of a rural landscape. In the foreground, there is a grassy hill with tall, dry, yellowish-brown grass. A rustic fence made of wooden posts and wire runs across the middle ground. In the background, there are several bare, leafless trees under a pale sky. The text "Water Shed" is overlaid in the upper right, and "Water Catchment" is overlaid in the lower left.

Water Shed

Water Catchment



What is a Riparian Area?





Soil

Water

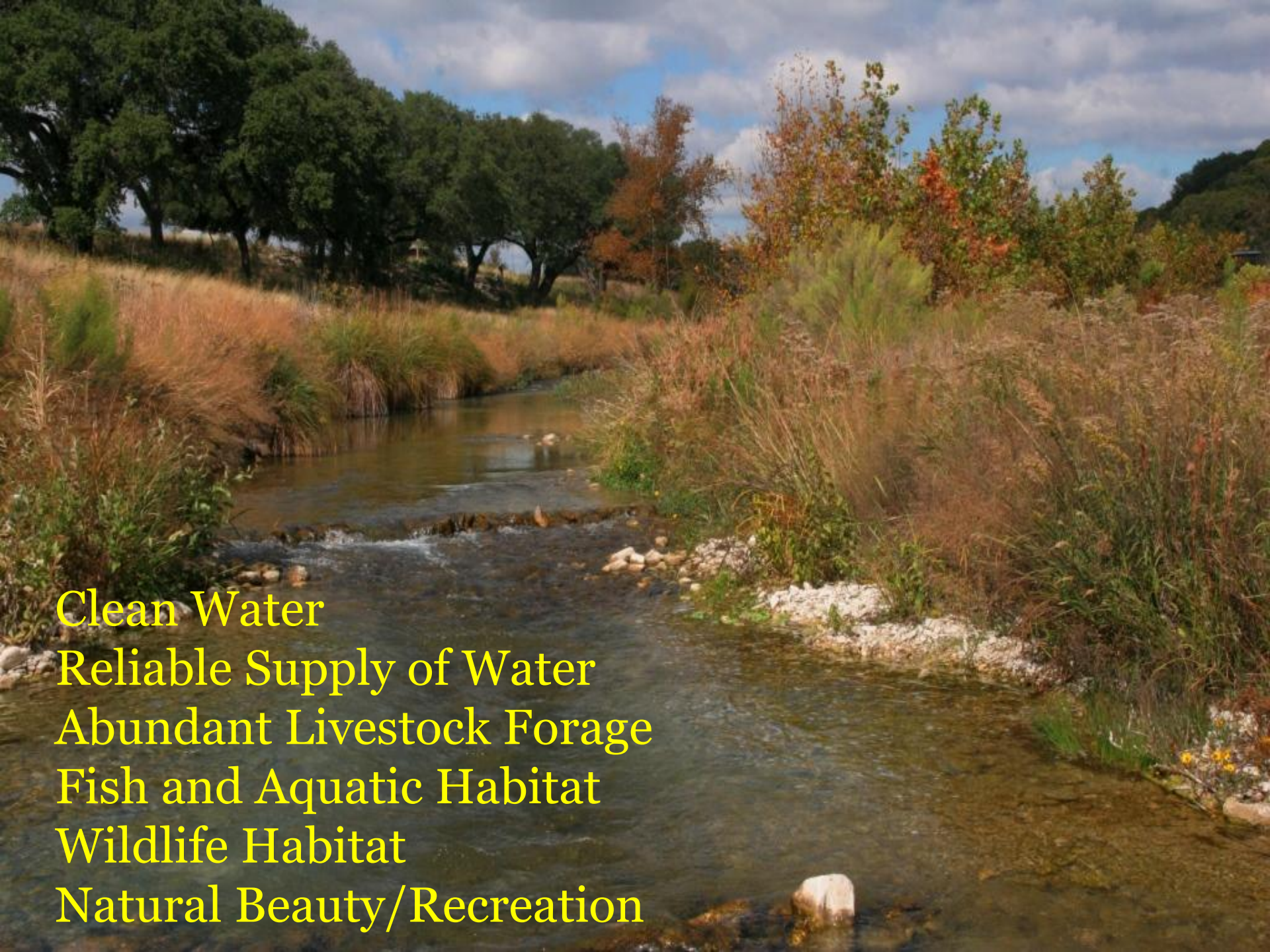
Vegetation





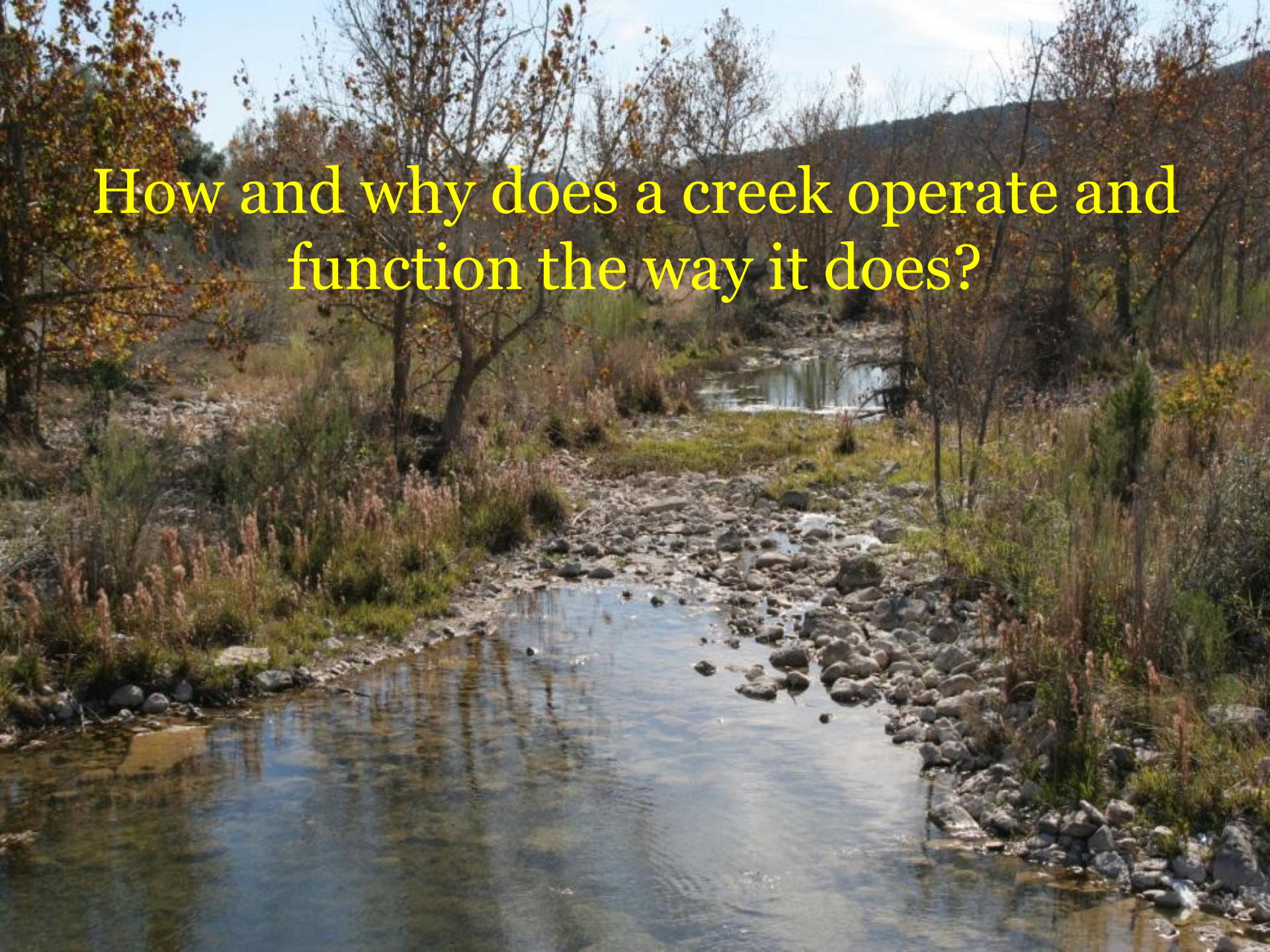
What are the values you appreciate about healthy creeks and riparian areas?





Clean Water
Reliable Supply of Water
Abundant Livestock Forage
Fish and Aquatic Habitat
Wildlife Habitat
Natural Beauty/Recreation

How and why does a creek operate and function the way it does?



Identify the Components of a Creek / River

- Channel / Banks
- Floodplain
- Sediment
- Base flow
- Flood flow
- Water table
- Vegetation
- Large wood
- Organic debris

The Dynamics and Processes that occur

- Erosion / Deposition
- Bankfull discharge
- Sinuosity
- Width : Depth Ratio
- Gradient
- Recruitment
- Root density
- Channel stability
- Plant succession



A photograph of a small, shallow stream flowing through a riparian area. The water is clear and flows over several large, smooth, light-colored rocks. The banks are covered with dense vegetation, including tall grasses and various trees and shrubs. The sky is blue with some light clouds. The text "What is a Properly Functioning Riparian Area?" is overlaid in the center of the image in a yellow, serif font.

What is a Properly Functioning Riparian Area?

Properly Functioning Riparian Area

Adequate vegetation, landform or large woody material to:

- Dissipate stream energy
- Stabilize banks
- Reduce erosion
- Trap sediment
- Build / enlarge floodplain
- Store water
- Floodwater retention
- Groundwater recharge
- Sustain baseflow

- Water quality
- Water quantity
- Forage
- Aquatic habitat
- Wildlife habitat
- Recreational value
- Aesthetic beauty

Physical Function



Values



A diagram showing a transverse wave pulse reflecting off a fixed boundary. The pulse is represented by a curved line with an arrow indicating its direction of travel towards the boundary. Upon reflection, the pulse is inverted, and the reflected pulse is shown with an arrow indicating its direction away from the boundary.

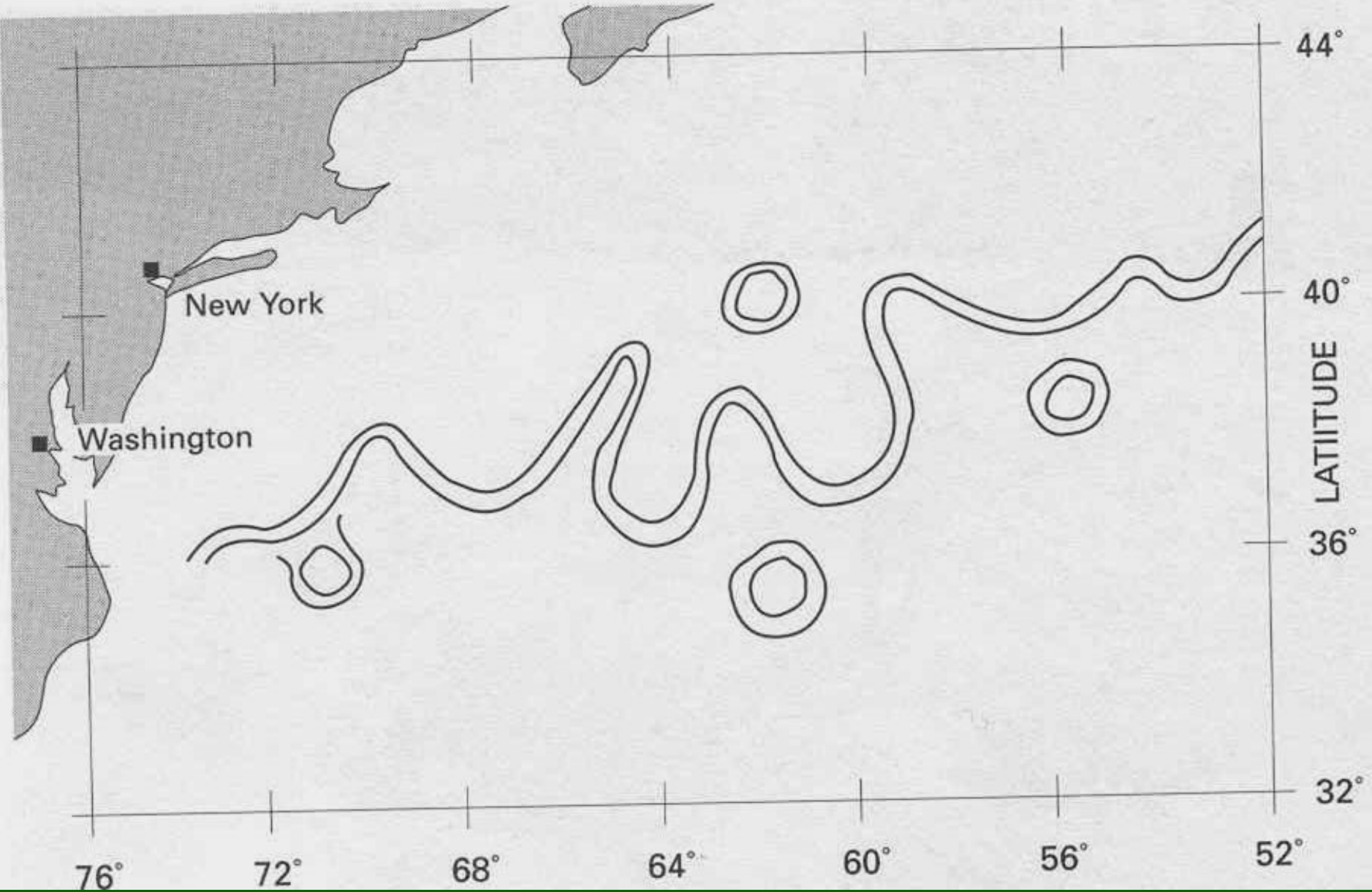
Point bar

Concave bank

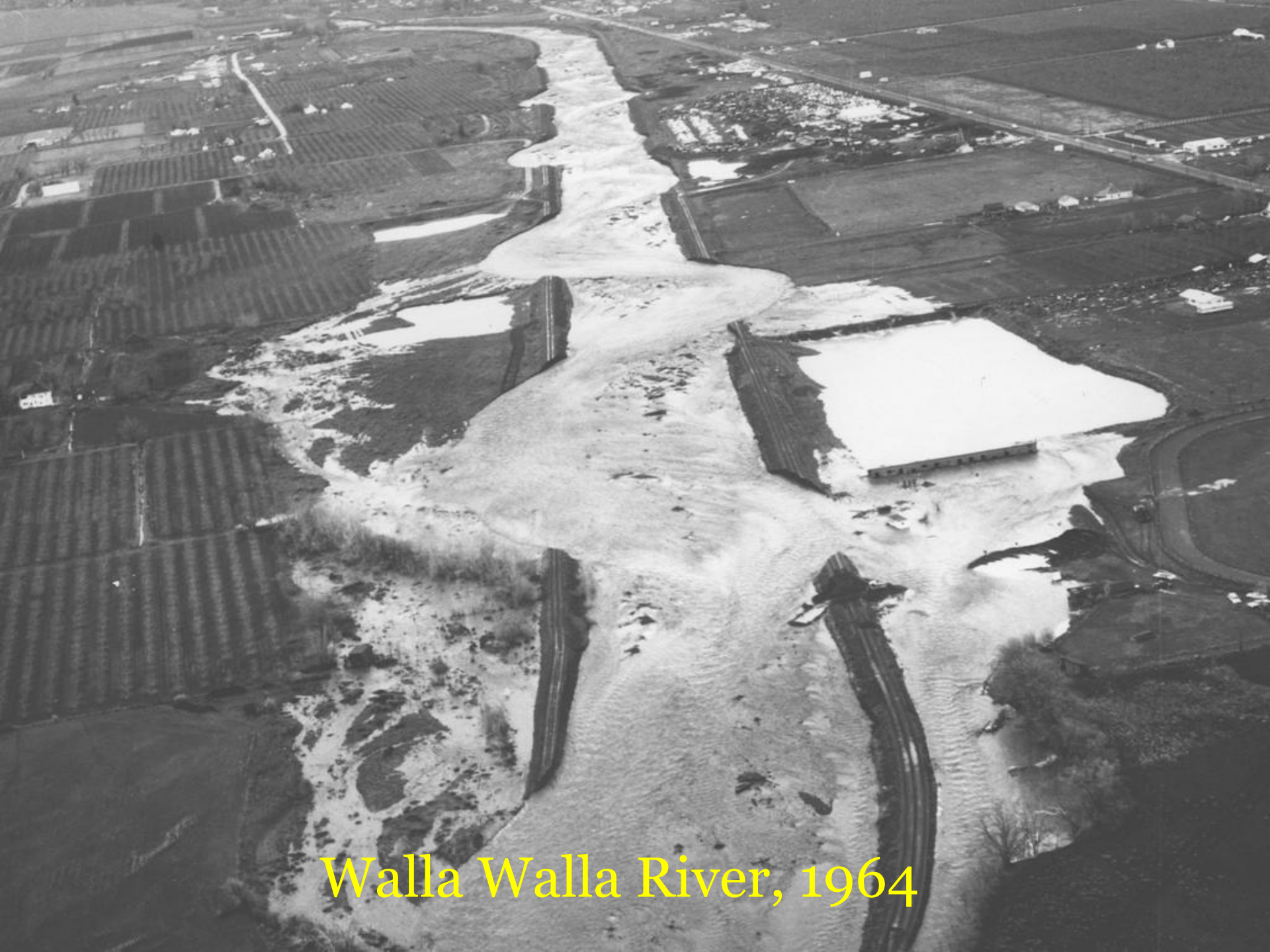
Zone of accumulation
or deposition

Zone of erosion


Circulatory current in water flowing around a river bend



Meandering of Gulf Stream in Atlantic



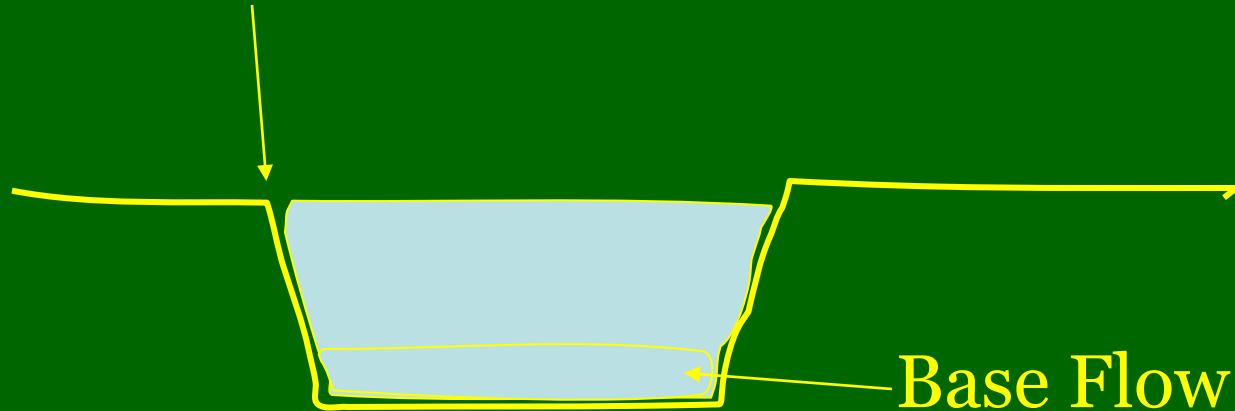
Walla Walla River, 1964

A photograph of a winding creek flowing through a lush green field. The creek starts in the foreground and meanders towards the horizon, illustrating the concept that creeks do not want to be wide and straight. The surrounding landscape is covered in dense green vegetation, and the sky is overcast with soft clouds. In the distance, some hills and utility poles are visible.

Lesson 1:
Creeks do not want to
be wide and straight

Bankfull Flow

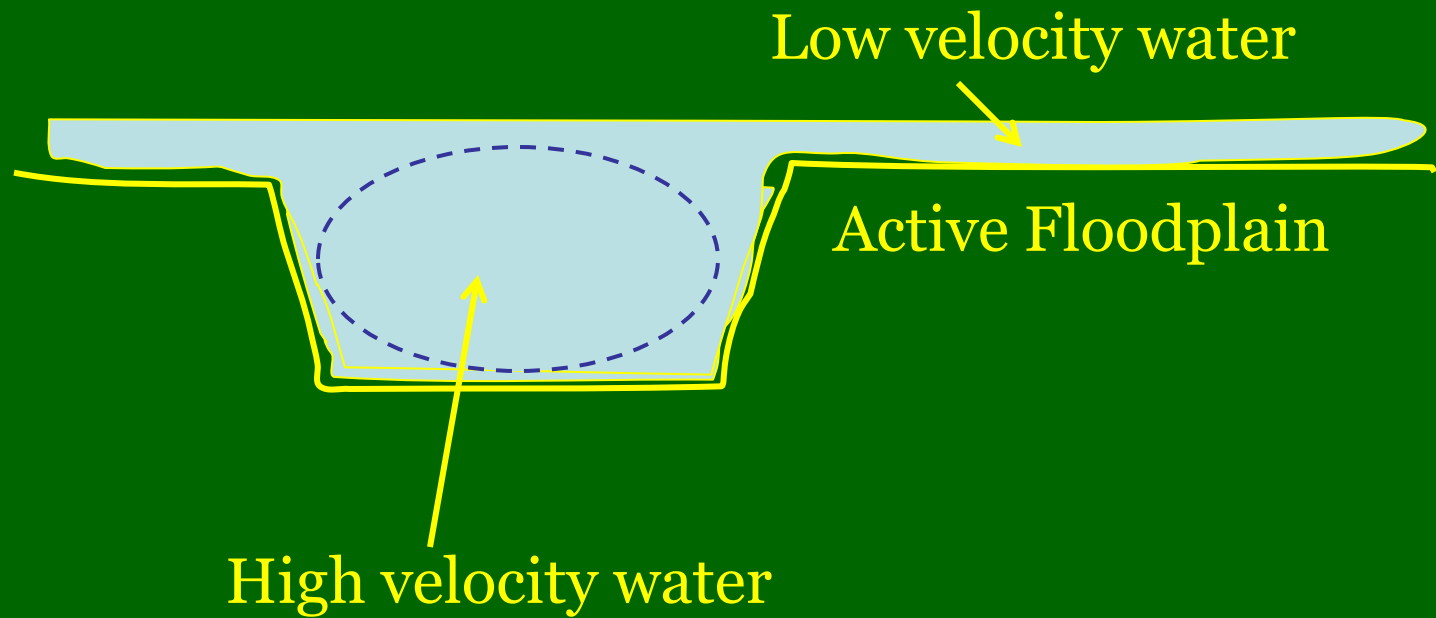
1 – 2 Year Flood



Base Flow

Lesson 2:

Floodplains Dissipate Energy and Trap Sediment

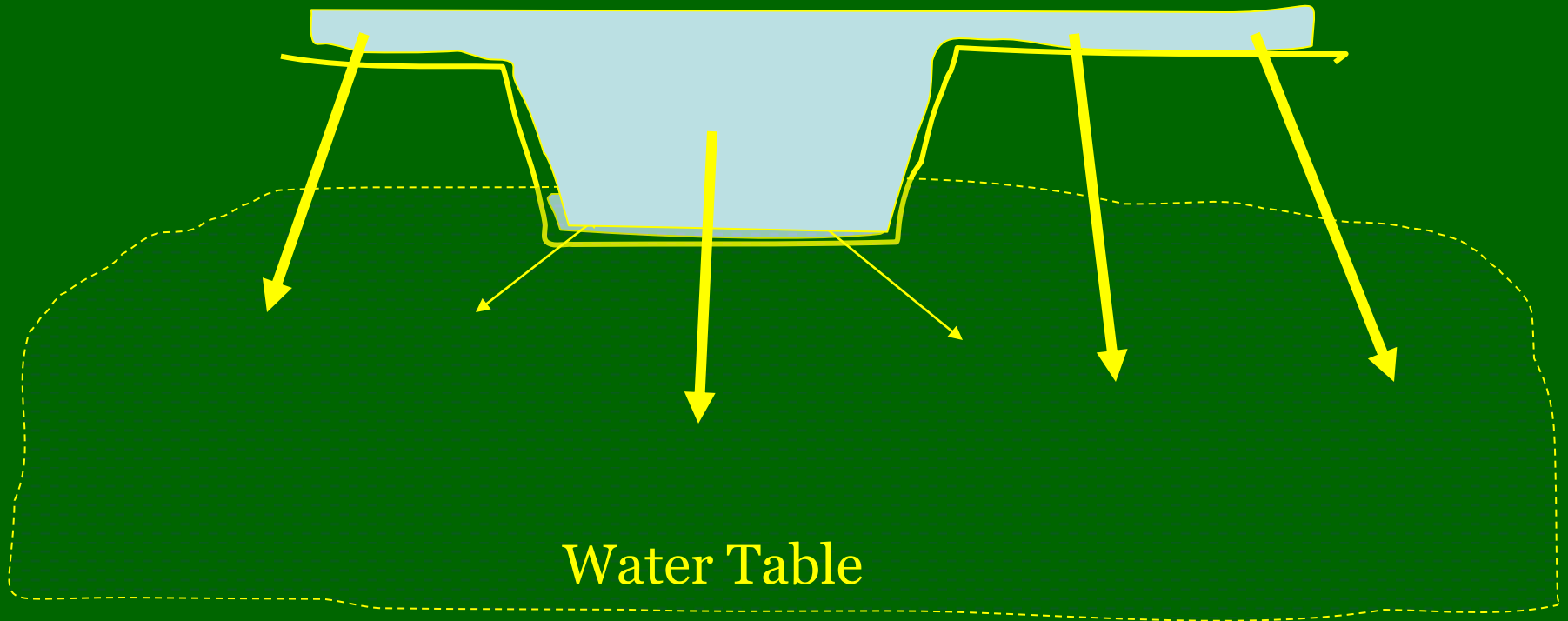




Floodplain

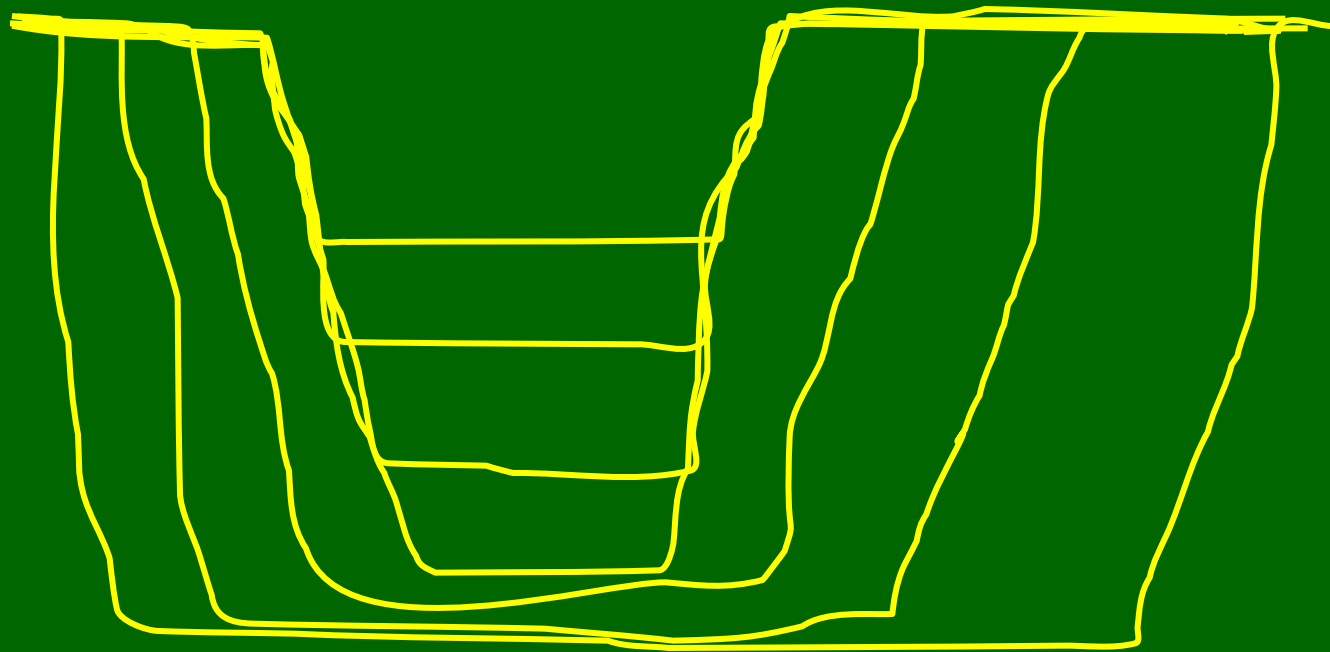
Lesson 3:

Flooding Recharges Water Tables



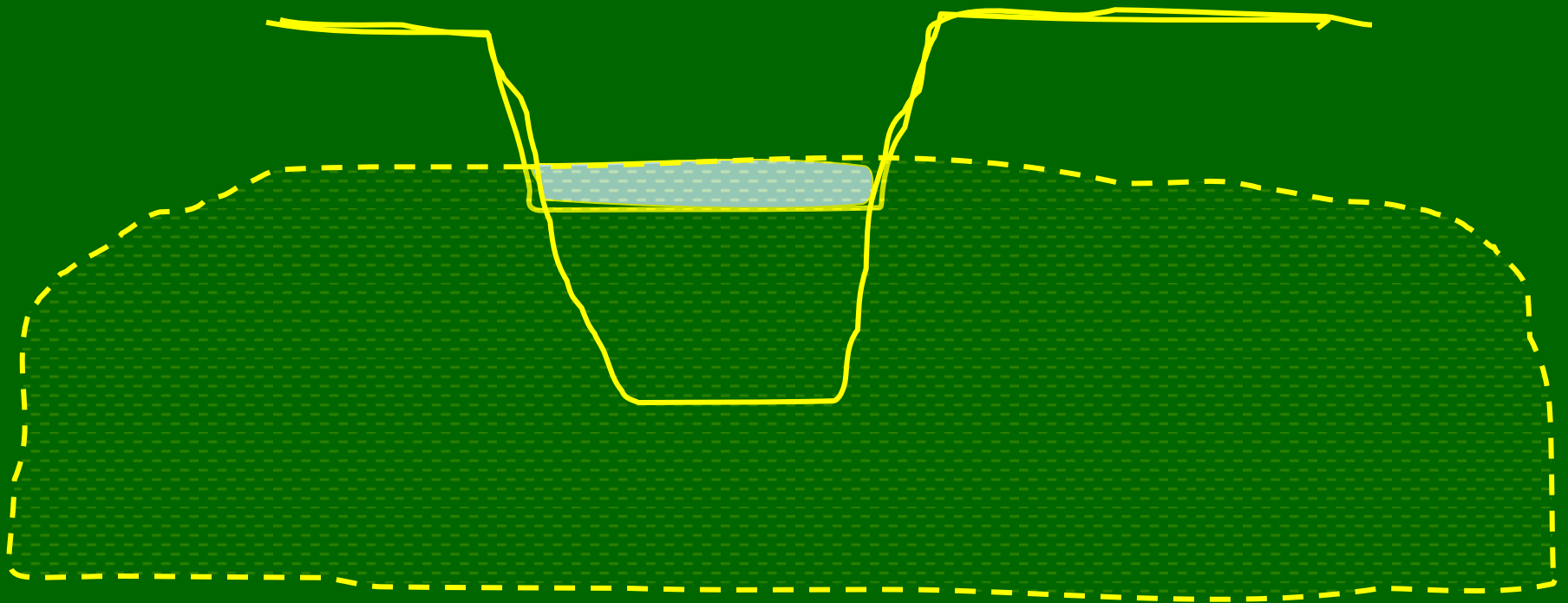
Lesson 4:

Excessive Erosion Enlarges the Channel



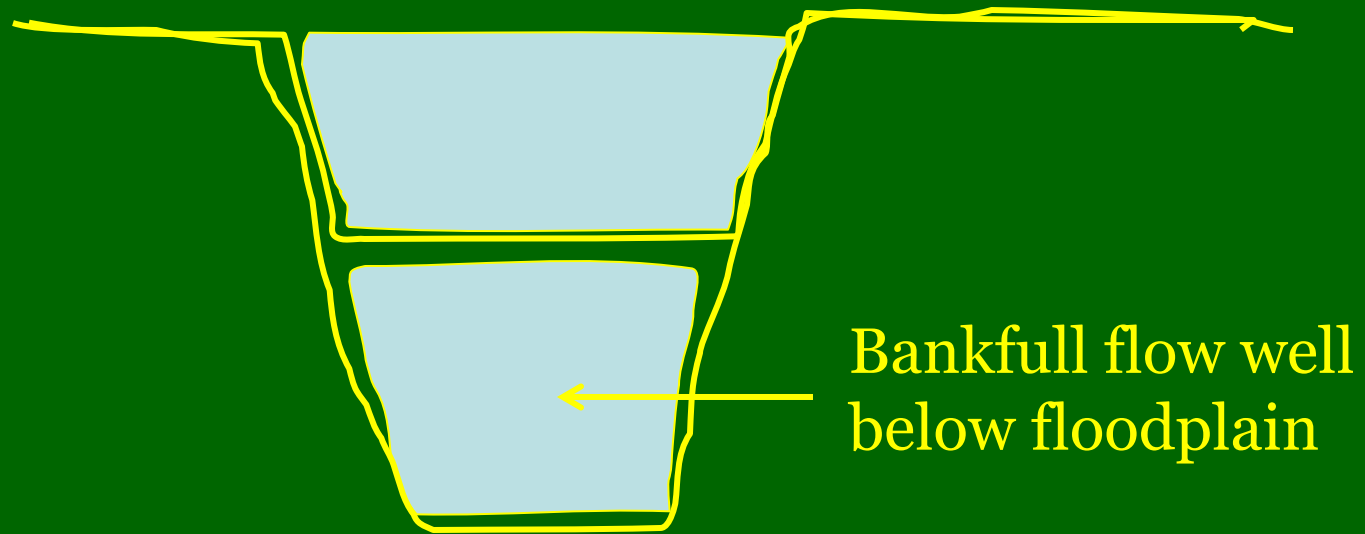


Lesson 5: Down-cutting Drains the Water Table



Lesson 6:

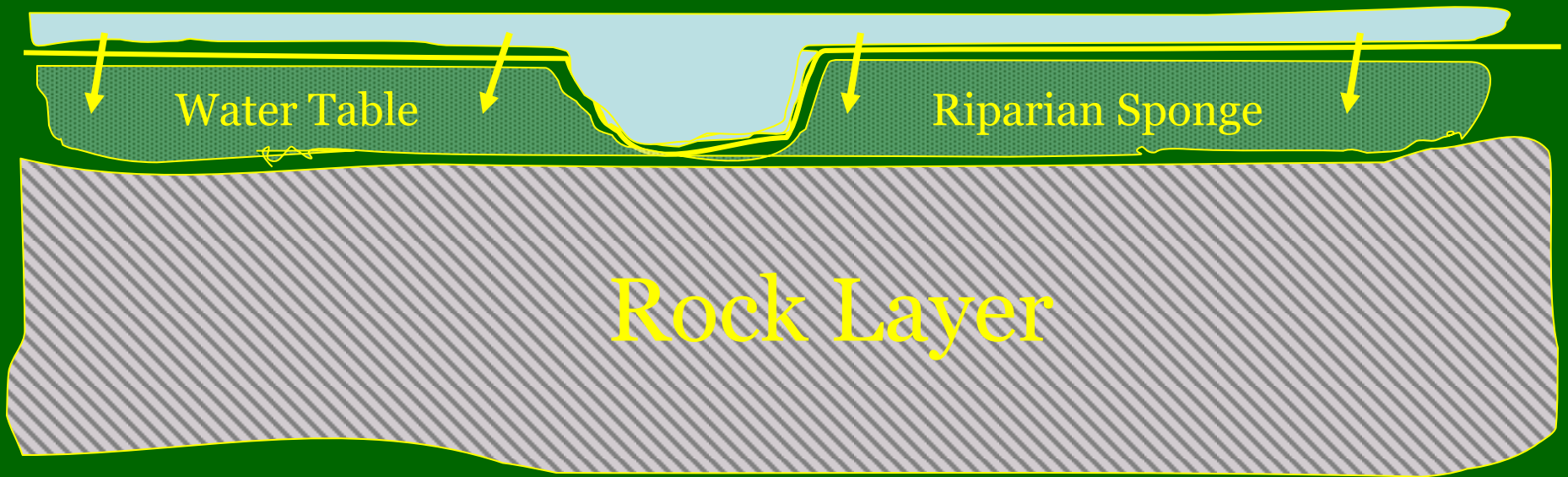
Down-cutting: Loose Access to Floodplain





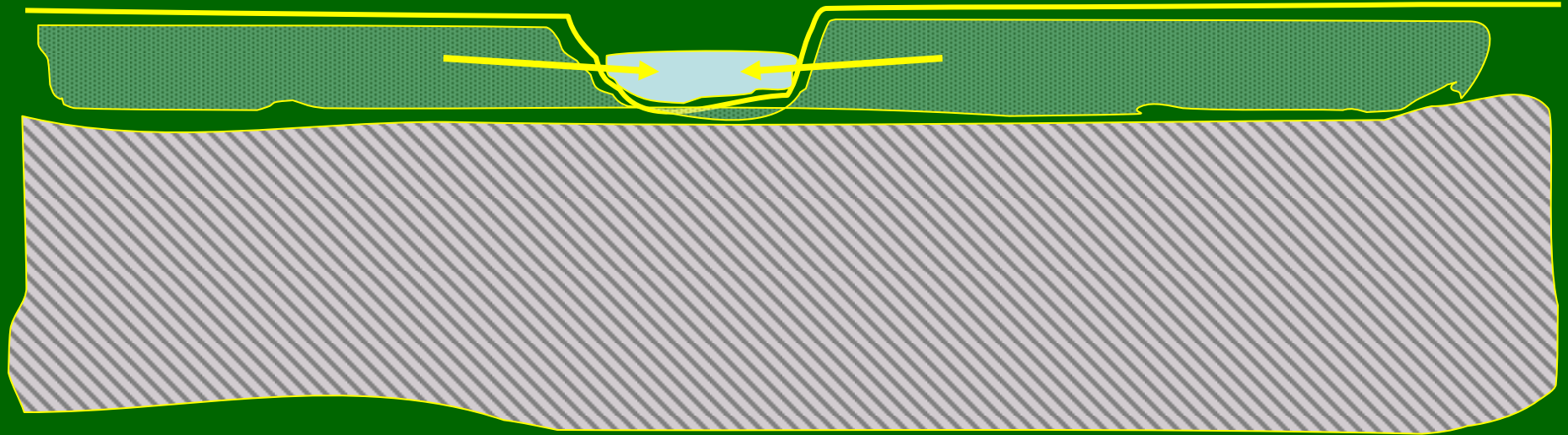






Lesson 7:

The Water Table Sustains Base Flow

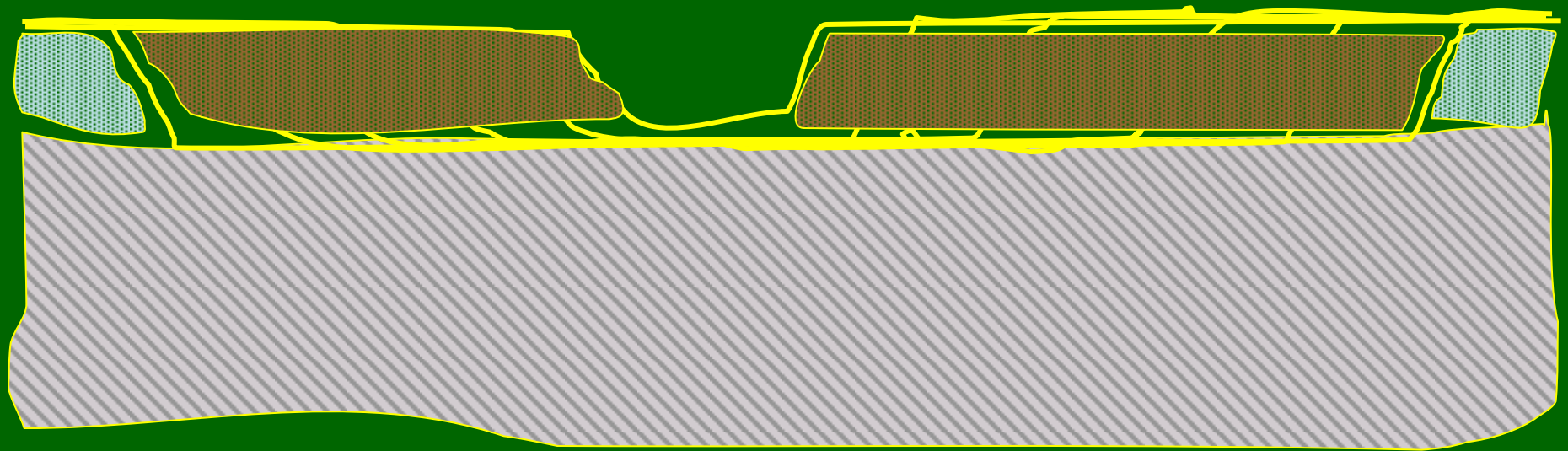


Riparian Sponge



Lesson 8:

Channel Widening Reduces the Riparian Sponge





Lesson 9:

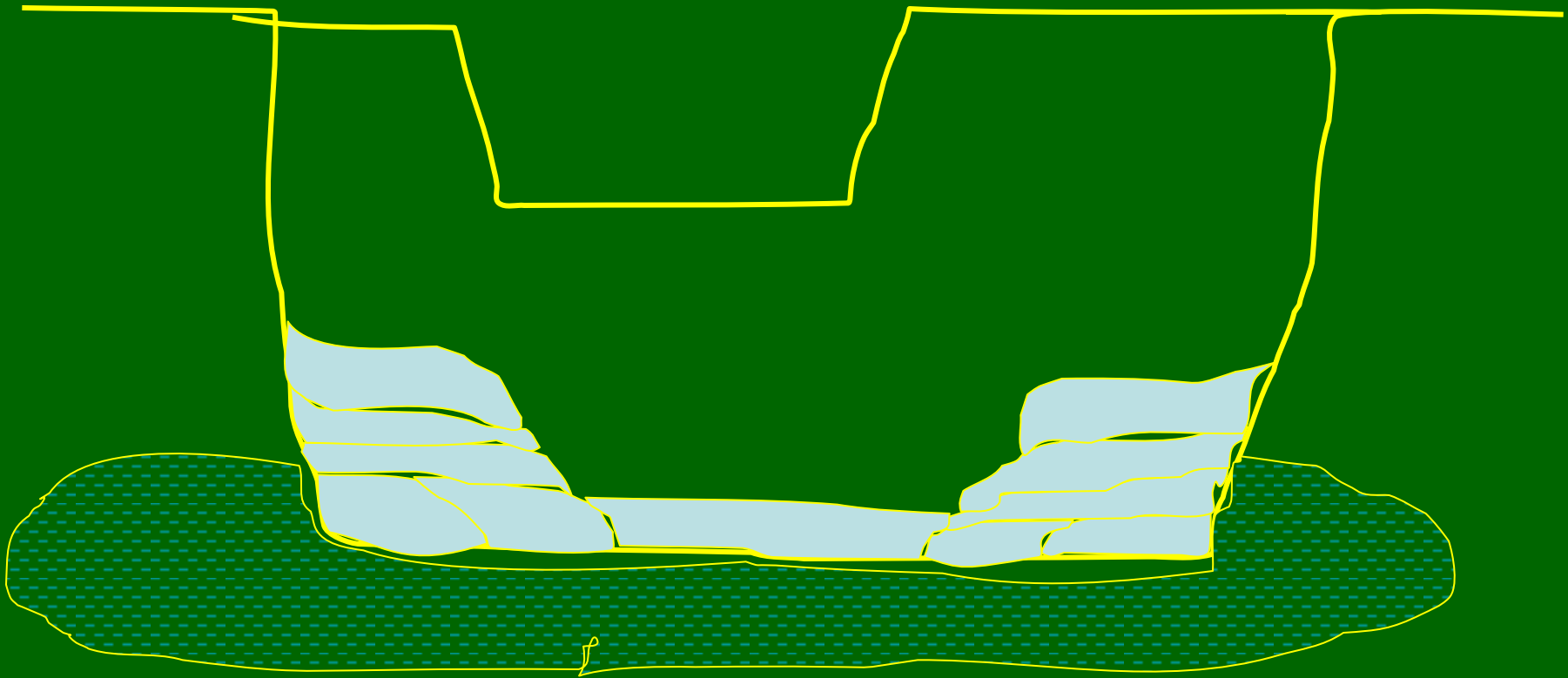
Overly Wide Channels Reduce Sediment Transport Ability





Lesson 10:

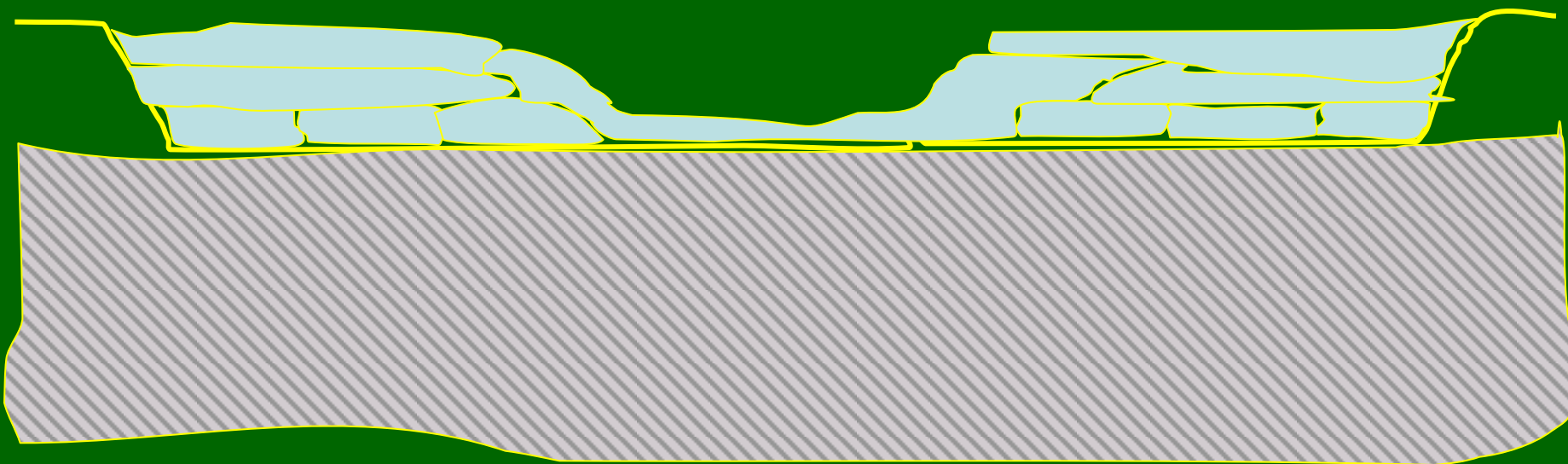
Degraded and eroded channels can be restored



Natural Channel Restoration









A photograph of a river flowing through a riparian area. The river is in the center-right, with white rapids. The left bank is covered in dense, tall, brownish-yellow grasses and shrubs. The right bank is also covered in similar vegetation. In the background, there are more trees and a clear blue sky. The text "Vegetation is the Key to Healthy / Functional Creeks and Riparian Areas" is overlaid in yellow on the left side of the image.

Vegetation is the Key to
Healthy / Functional Creeks
and Riparian Areas

The Role of Riparian Vegetation:



Dissipate Energy

Reduce Erosion

Trap Sediment

Help Create / Enlarge Riparian Sponge

Slow Down the Water



Flooding is Essential



How to Maintain or Restore Riparian Areas:

- Creeks / Riparian Areas are special places; they deserve preferential treatment
- Remove the hindrances that inhibit natural restoration

Hindrances to Healthy / Functional Riparian Areas:

- Farming too close to the bank
- Mowing, spraying close to the creek
- Manicured landscapes next to the creek
- Grazing concentrations in creek areas
- Excessive deer, exotics, hogs in creek areas
- Burning in riparian area
- Removal of large dead wood
- Artificial manipulation of banks / sediment
- Excessive vehicle traffic in creek area
- Poorly designed road crossings / bridges
- Excessive recreational foot traffic in creek area
- Excessive alluvial pumping or other withdrawals

An aerial photograph showing a rugged, brownish-green landscape of hills and valleys. A large, dark, curved bay or inlet is visible on the right side of the image. The terrain is textured with patches of vegetation and exposed earth. The text "Hills to Bays" is overlaid in the center in a yellow, serif font.

Hills to Bays



